

(No Model.)

5 Sheets—Sheet 1.

J. DESMEDT.
CAR STARTER.

No. 495,964.

Patented Apr. 25, 1893.

Fig. 1.

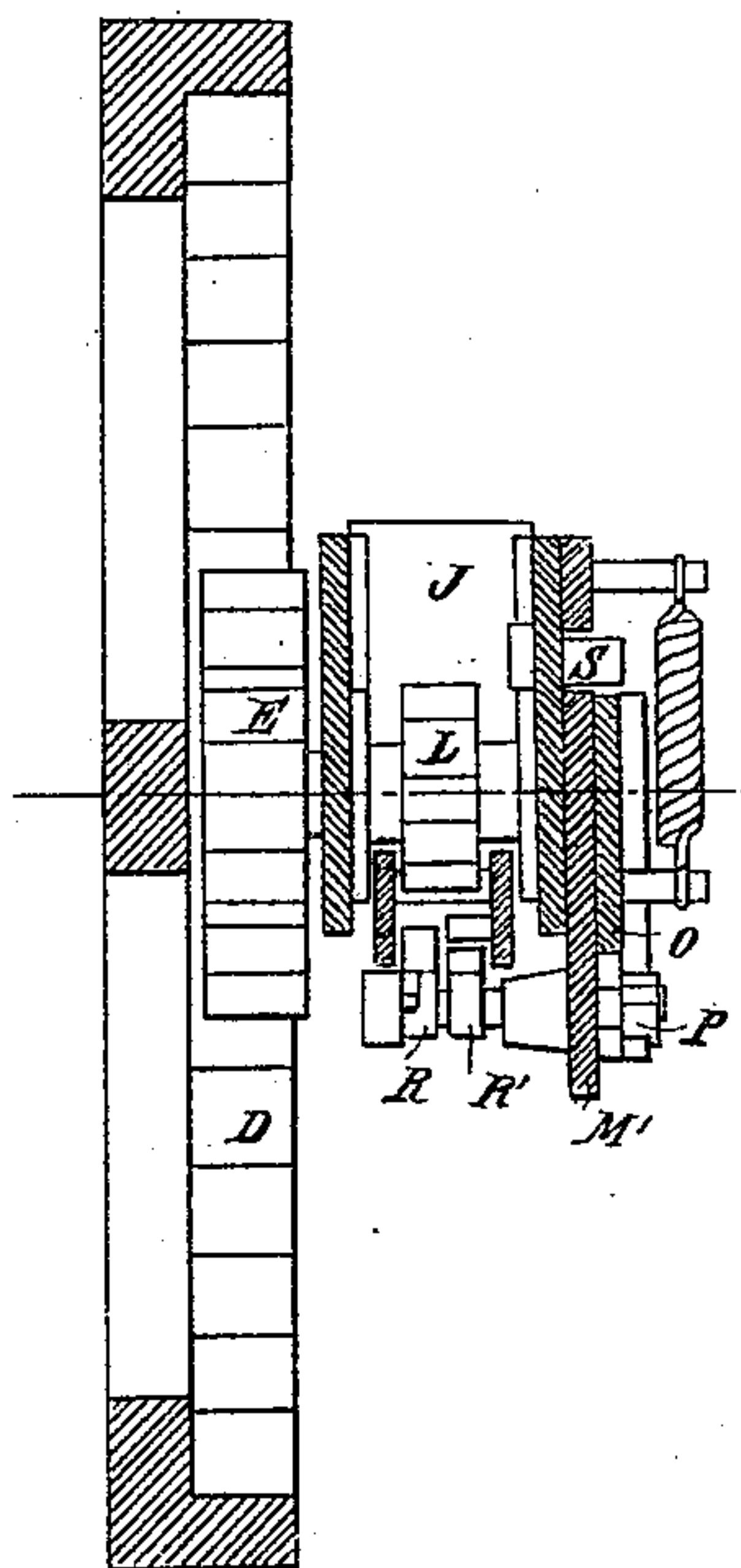
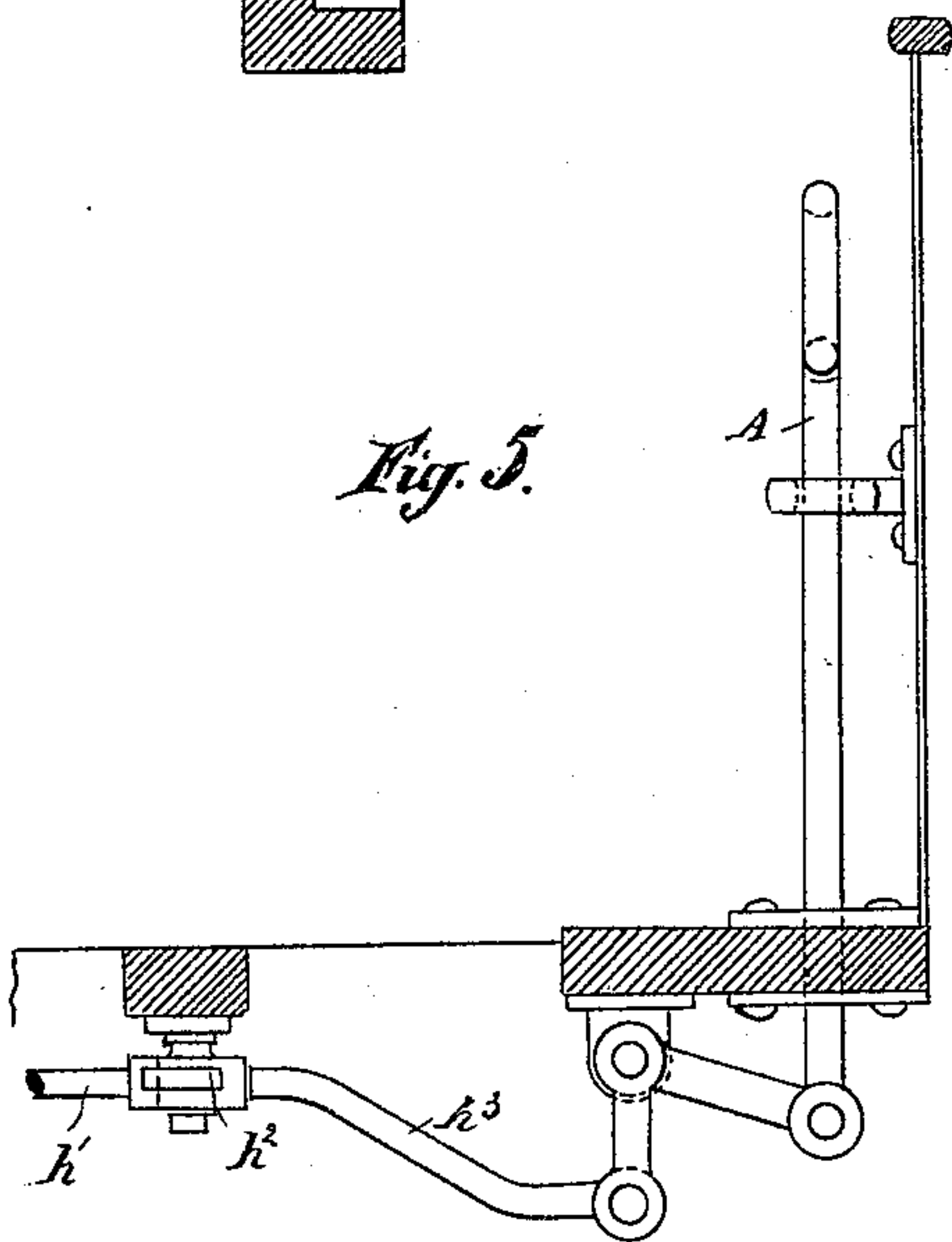


Fig. 5.



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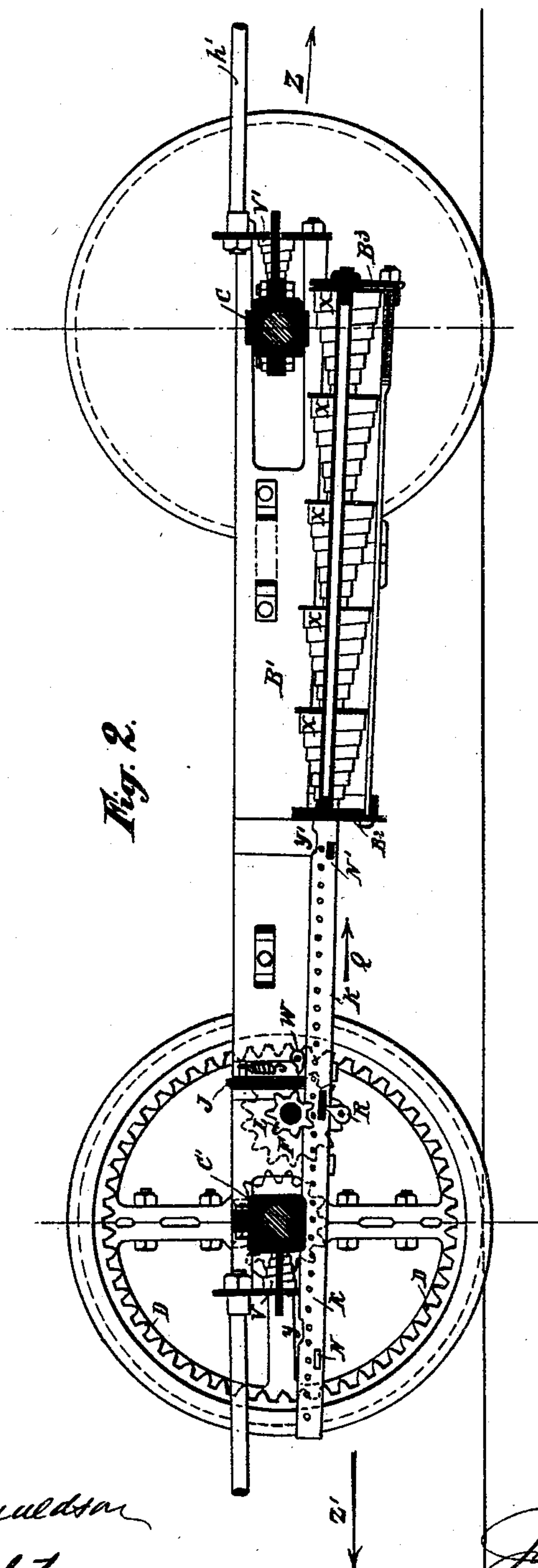
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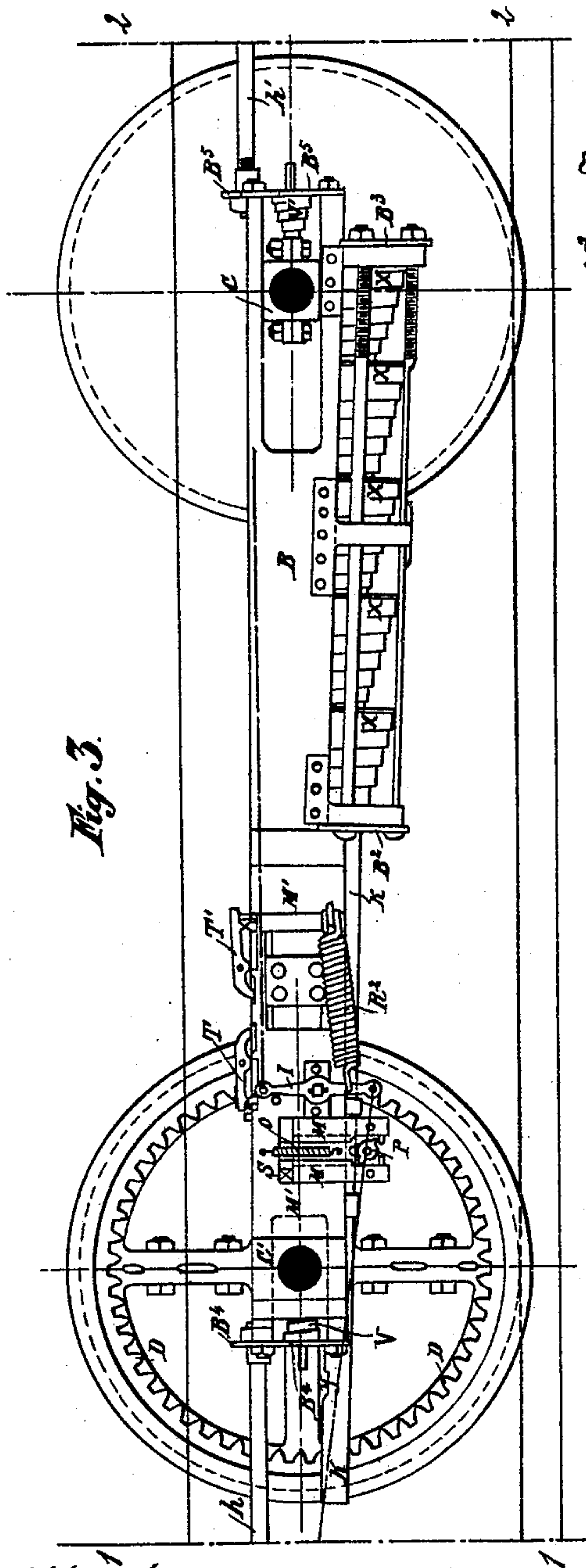


Fig. 3.

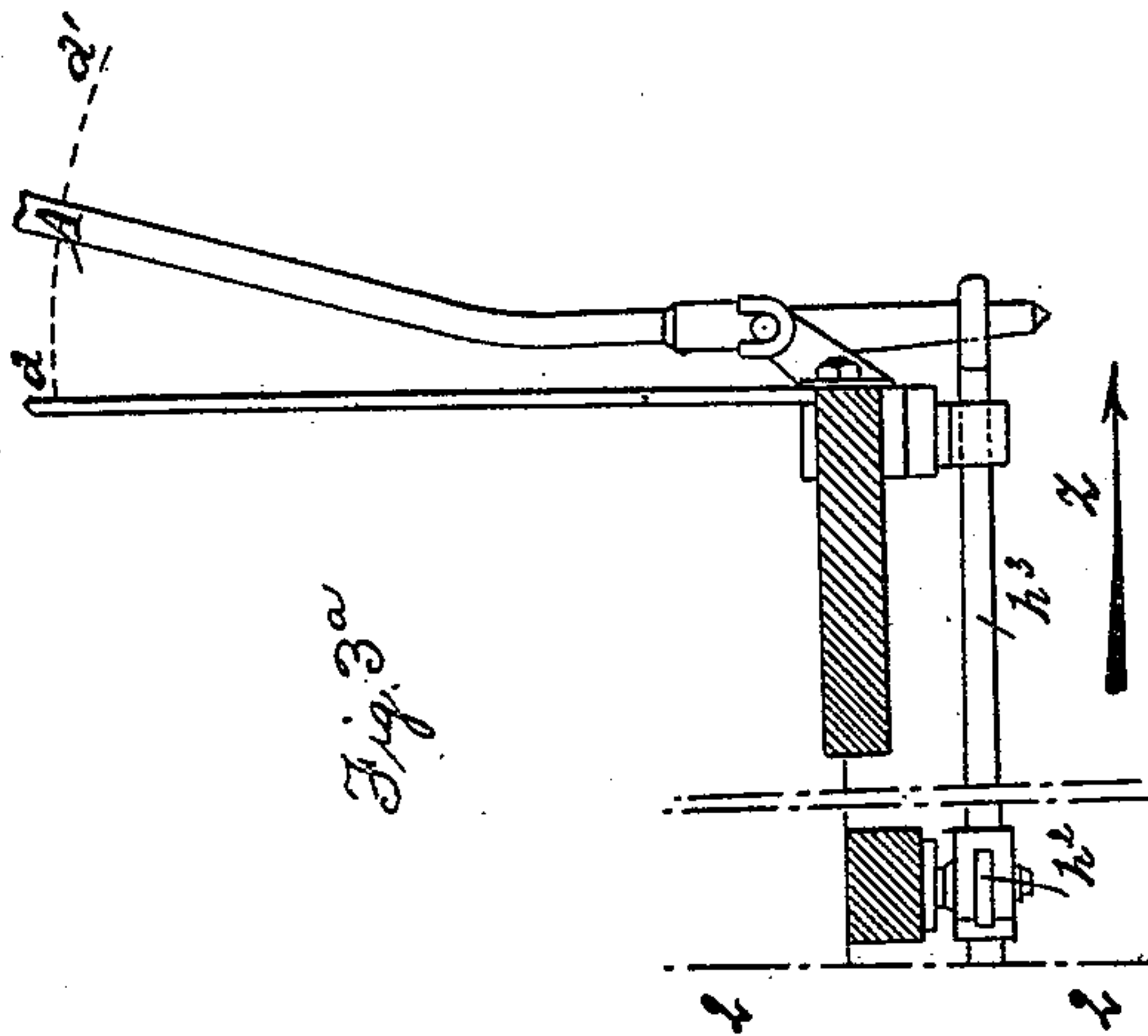


Fig. 3a

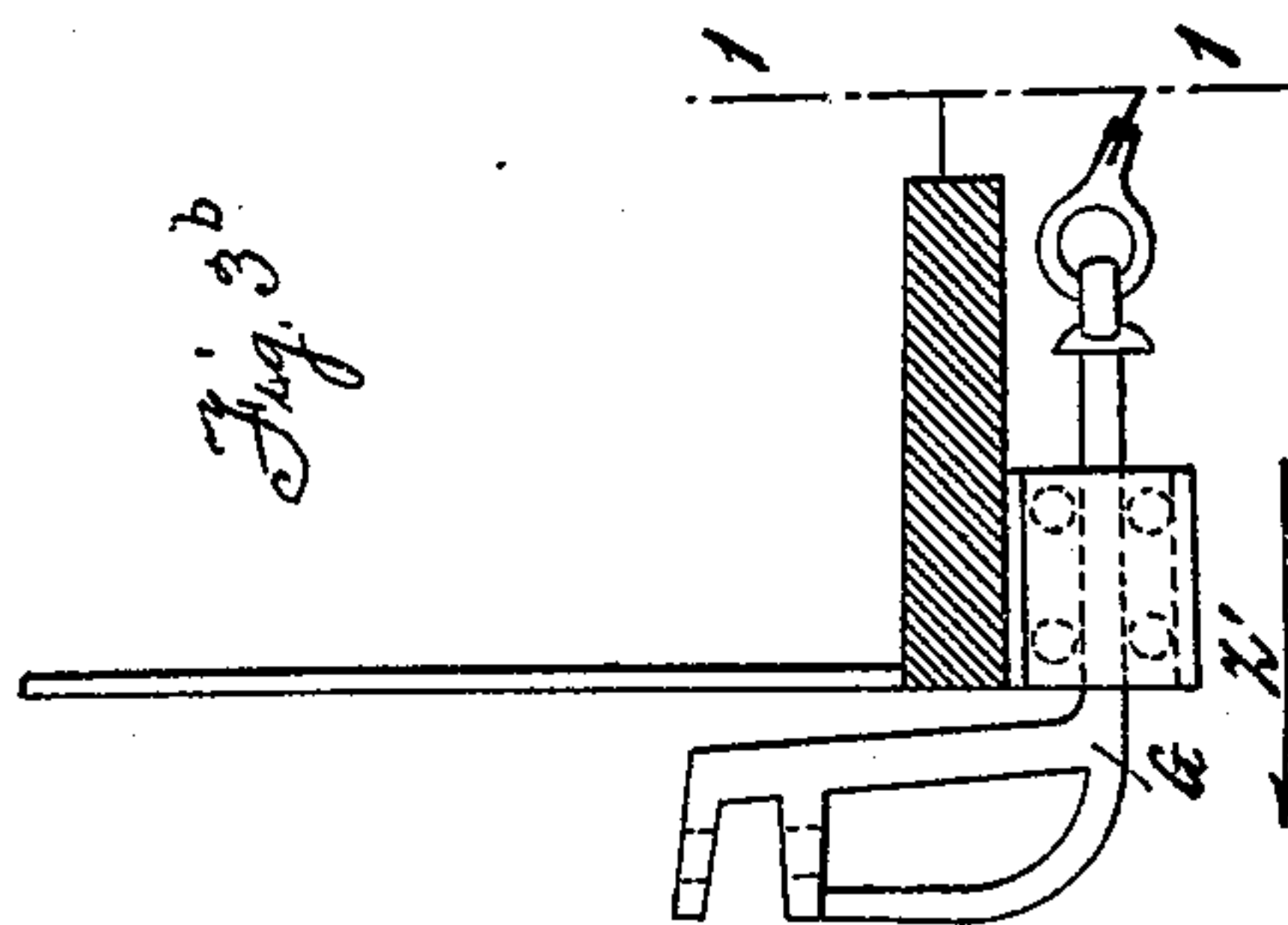


Fig. 3^b

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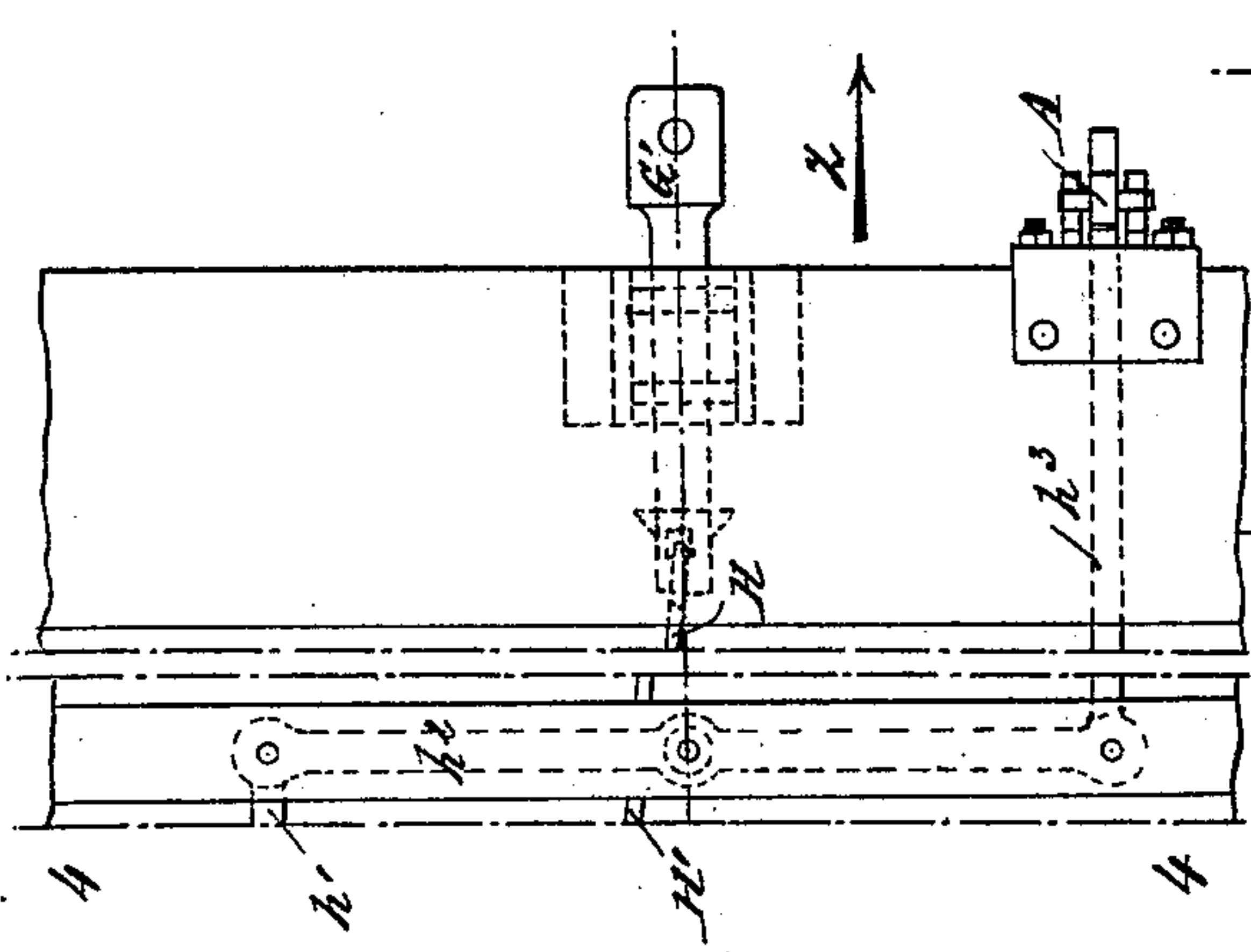


Fig. 4a.

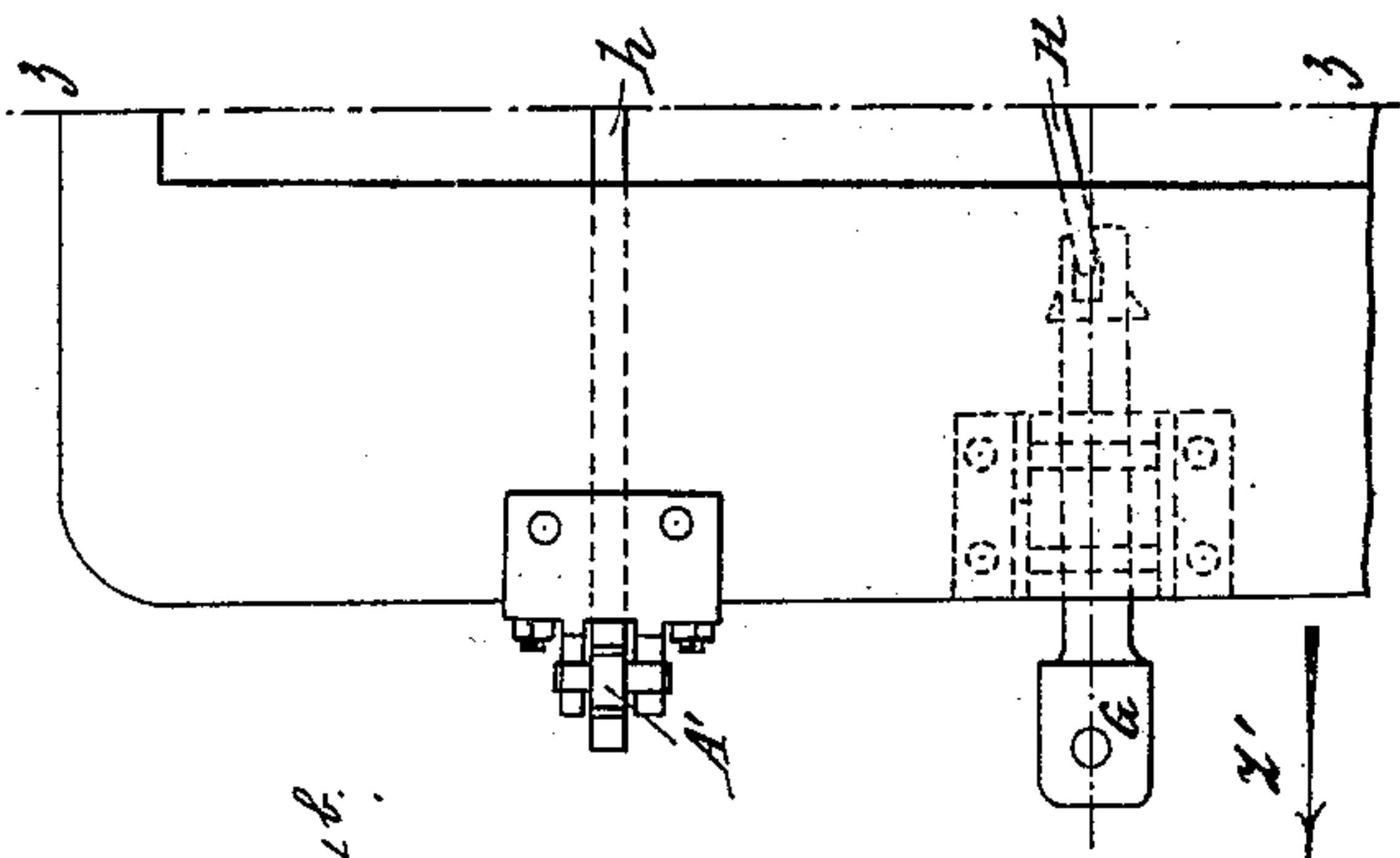


Fig. 4b.

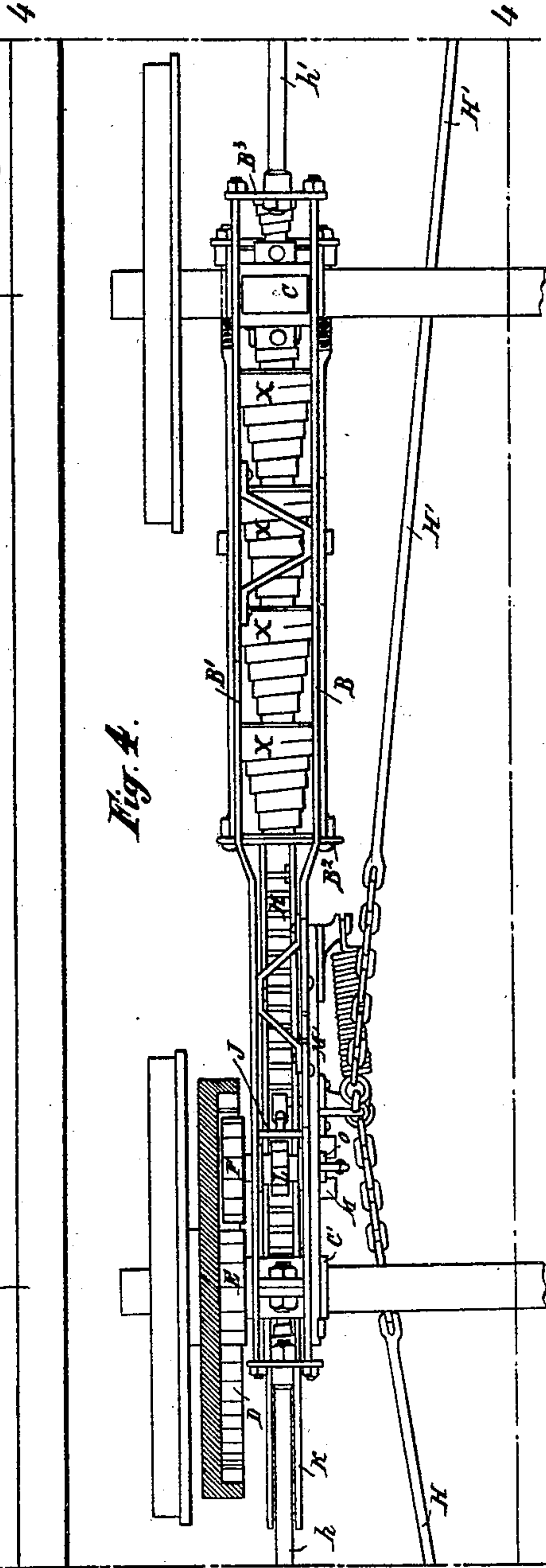


Fig. 4.

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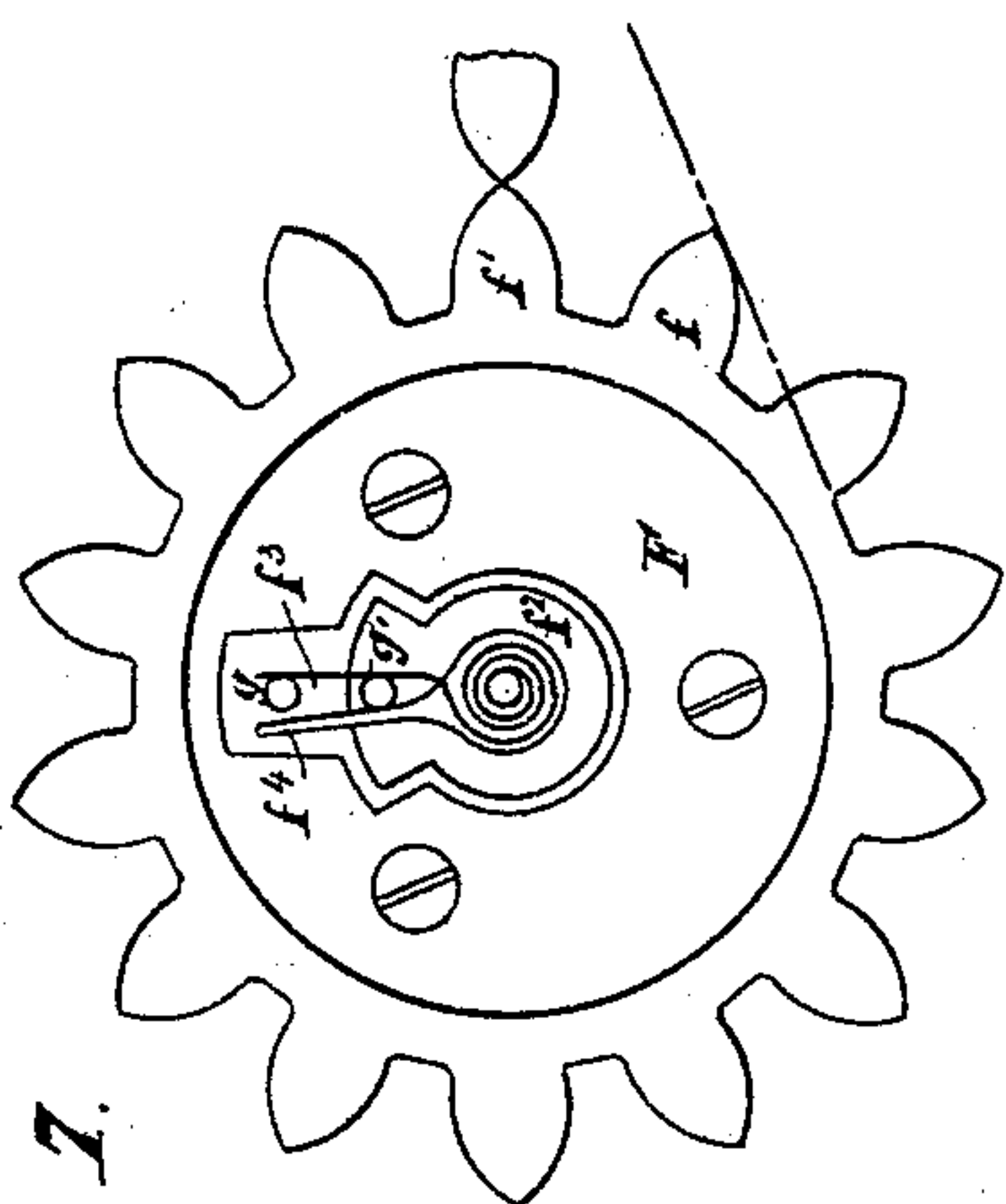
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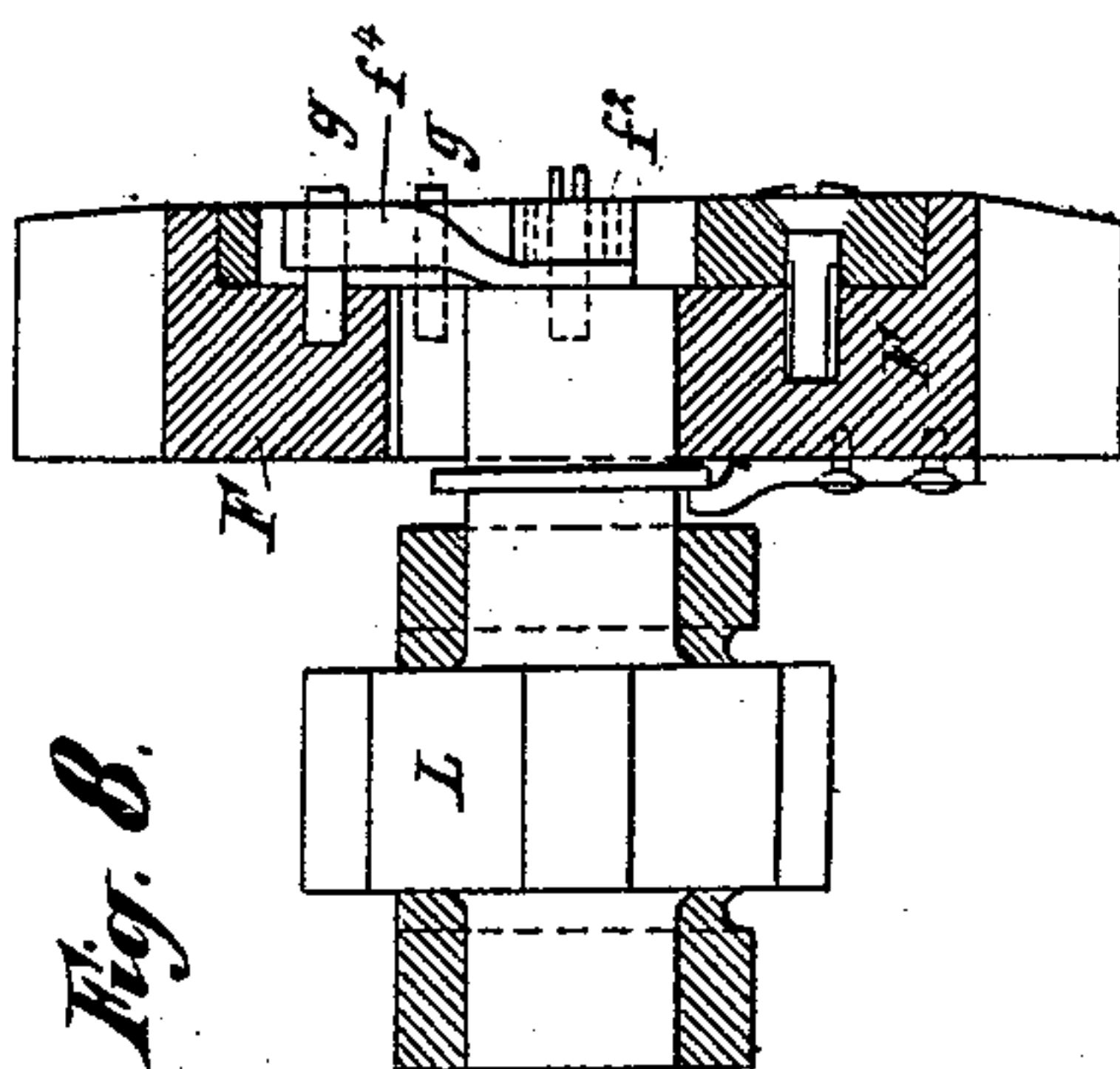


Fig. 8.

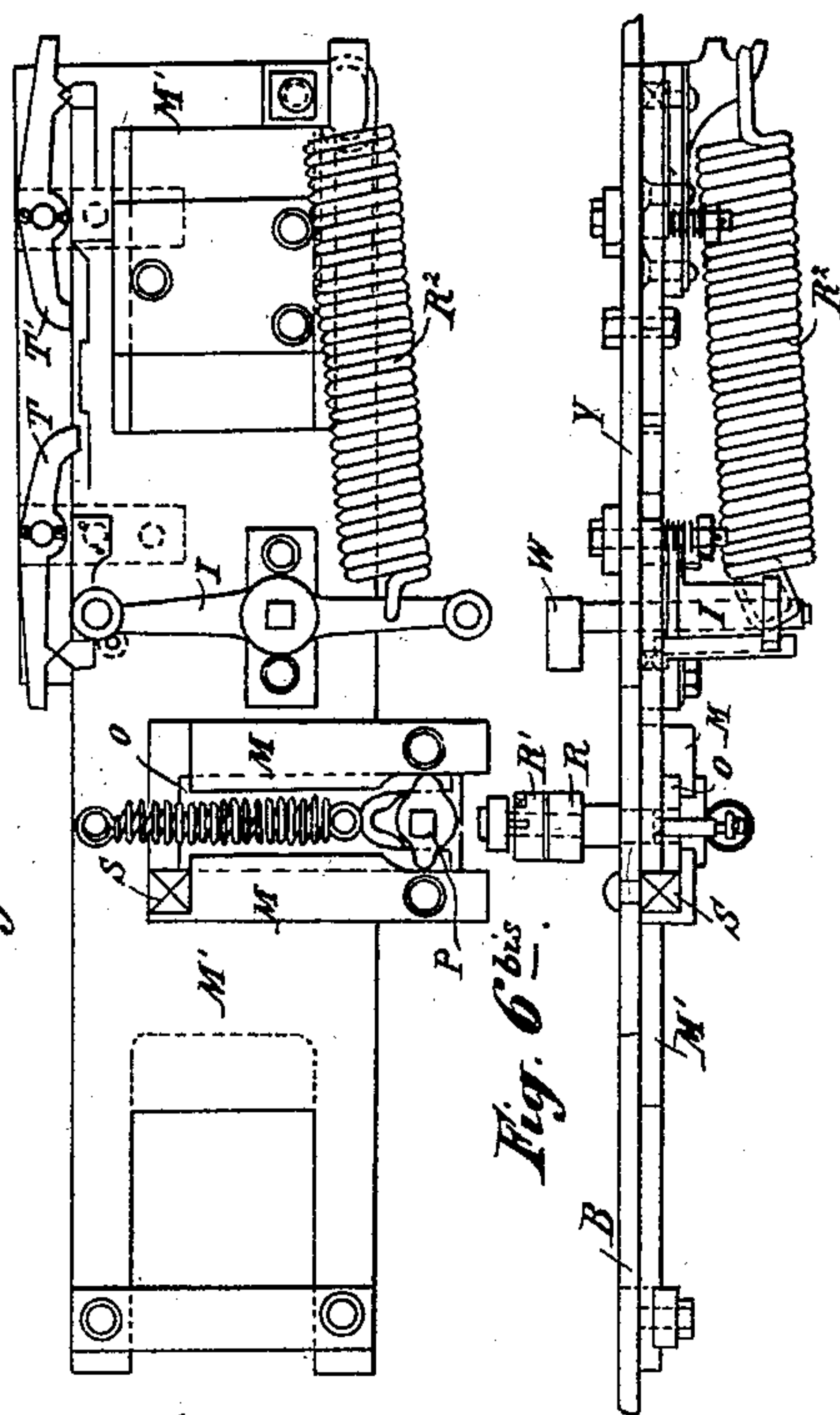


Fig. 6.

Fig. 6^{bis}.

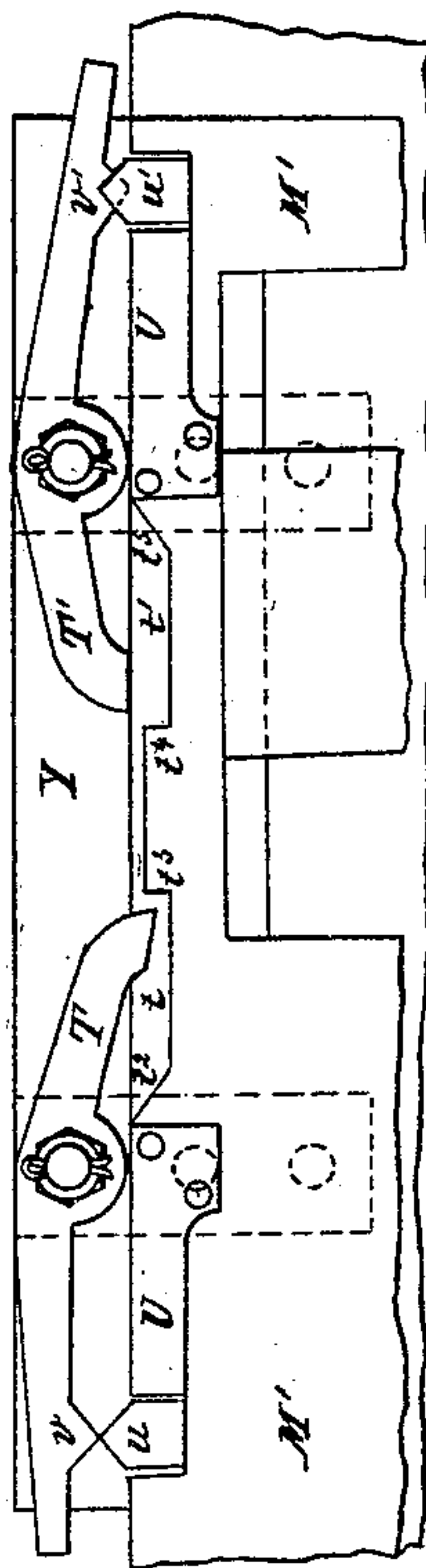


Fig. 9.

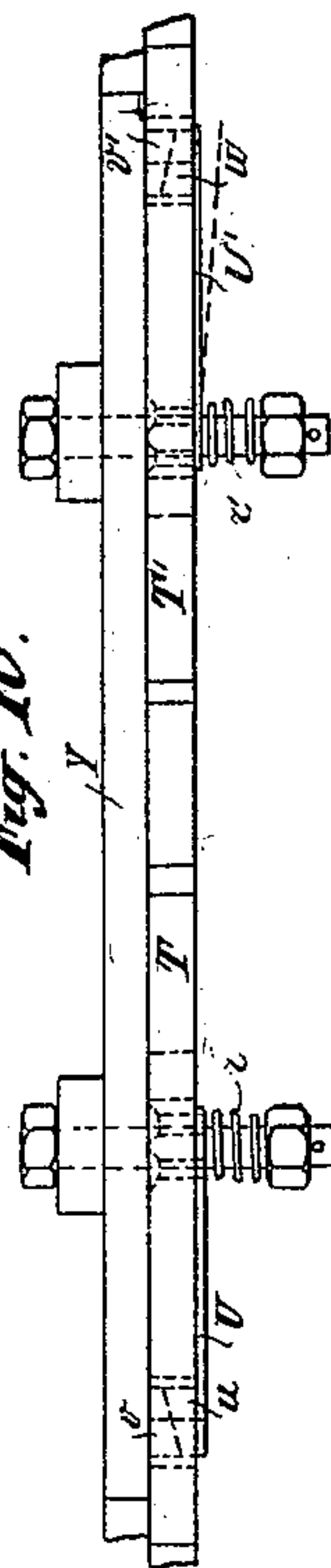


Fig. 10.

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UNITED STATES PATENT OFFICE.

JOSEPH DESMEDT, OF BRUGES, BELGIUM.

CAR-STARTER.

SPECIFICATION forming part of Letters Patent No. 495,964, dated April 25, 1893.

Application filed December 6, 1892. Serial No. 454,212. (No model.) - Patented in Belgium February 6, 1892, No. 98,241.

To all whom it may concern:

Be it known that I, JOSEPH DESMEDT, a subject of the King of the Belgians, residing at Bruges, in the Kingdom of Belgium, have invented certain new and useful Improvements in Apparatus for Starting Tram-Cars and other Vehicles, for which I have obtained a patent in Belgium dated February 6, 1892, No. 98,241, of which the following is a specification.

This invention has for its object to automatically effect the starting of tramcars and other vehicles by storing during their progress and at the moment at which the driver or conductor shall judge opportune the necessary force for putting them again in motion after stoppage.

In the accompanying drawings,—Figure 1 is a transverse section of part of the apparatus showing its driving and engaging mechanism. Fig. 2 is a longitudinal section. Fig. 3 is a longitudinal elevation; and, Figs. 3^a and 3^b show respectively the ends of the platform of the car shown in Fig. 3, representing a continuation of that figure, being detached views respectively on the lines 2—2 and 1—1 of Fig. 3; Fig. 4 a plan of the apparatus. Figs. 4^a and 4^b represent dotted continuations of Fig. 4, on the lines 4—4 and 3—3. Fig. 5 is a detail of the operating lever conveniently arranged inside the platform hand-rail. Figs. 6 and 6^b are details of the stop-clutch of the pinion which receives movement for keeping the said pinion in gear. Figs. 7 and 8 are details of the said receiving pinion showing the peculiar arrangement for causing it to gear quickly. Figs. 9 and 10 are details of the spring-pawl arrangement of the recuperating apparatus serving to prevent its accidental engagement.

This apparatus is of remarkable simplicity and strength although of relative lightness (about one hundred and fifty kilos in weight) will start with the greatest ease and always in the direction in which it is going, a car resting upon rails of a total weight of four thousand five hundred kilos including the load. For greater loads the apparatus will not require any modification except the substitution of the spring shown for stronger springs relatively to the increase of the load. The operation is besides easy and does not entail any increase of care on the part of the

conductor. In fact all that is necessary to do is to move from A to a during the motion of the car and at the required moment the lever A which is situated in the front on a level with the mud-guard. This lever is removable, that is to say, the same lever serves alternately at each end of the car upon the platform following the direction of the travel of the vehicle. By this movement and without involving any other action the said lever causes the series of volute or other springs X, X to be compressed. When the latter have been compressed to a given degree, the lever A returns automatically to A and the apparatus is ready to start the car after its stoppage.

For replacing the operating lever of the rod h by a crank arrangement it is only necessary to adapt a rack to the rod h (at h³ or h) or to convert a part of the latter into a rack in which is caused to gear a pinion keyed to a vertical rod terminated above by a hand-wheel or crank-handle, the said crank-handle working in a notched support serving to hold the apparatus in a neutral position, that is to say, when the pinion F is not engaged with the pinion E nor with the gear-wheel D. This recuperator consists of the following parts:—

B, B' are slide-cheeks connected together by end links B², B³ and intermediate tie-bars. They serve to support the whole apparatus and rest on two bearings C, C' placed on the axles of the car near the wheels. They thus form a movable frame containing on the one hand the series of recuperating volute or other springs X, X and carrying on the other hand the rack K. This arrangement constitutes the recuperating apparatus which is connected at one end by the rod h to the operating lever when the latter is placed at a' and at the other end by the rods and rocking lever h', h², h³ to the same lever when it is moved to A, as shown in the drawings Figs. 3 and 4.

J is a plate or stop, Figs. 2 and 4, sliding between two guides and serving to stop the rack K by falling into one or other of its notches y or y' (Figs. 2 and 3) according to the direction in which the carriage is traveling, when the springs X are compressed.

H and H' are traction rods, uniting the recuperator with the apparatus G, G' for drawing the carriage, and serving to effect the re-

lease of the said recuperator for the starting when the horses begin to draw the carriage. They are jointed the one H to the upper extremity and the other H' to the lower extremity of the pivoted lever I, Figs. 3 and 6.

D, E, F, L is a train of gearing, furnishing by its action on the rack K the driving power of the recuperating apparatus, whether for storing the force or for giving it up again as required. The main gear-wheel D with inside teeth, containing the central pinion E which is in one piece with it, is keyed on an axle against the inside face of one of the wheels of the carriage. The pinion F coupled to the pinion L which gears into the rack K is kept by its axle in the slide-cheeks B, B'. Guided by the latter it engages either with the main gear wheel D to start the carriage, or with the pinion E to compress the recuperative springs X, X and store the force. The carriage being in motion, for instance, in the direction of the arrow Z when it is a question of recuperating the force the conductor draws the operating lever A over toward him, from A to *a*. He thus shifts the recuperator in the direction of this motion. This motion carries the pinion F toward the central pinion E, with which it gears, and which turns with the axle upon which it is keyed; E then drives F and consequently also the little pinion L which is fixed on the same shaft as the latter. L then gearing with the rack K drives the latter in the direction of the arrow Q, Fig. 2, thus compressing the recuperator springs X until the stop J falls into the notch *y* (made in the upper edge of the rods of the rack K) which meets it. Then the projection N meets the cam R which is in one piece with the rotary retaining catch P (Figs. 3 and 6) which shoots the bolt O of a lock M attached to a fixed counter plate M'. The bolt O in being shot liberates the projection S of the slide-cheek B, which projection by bearing upon the said bolt stops the frame of the recuperator and thus keeps the pinion F engaged with the central pinion E.

The axle of the pinion L is only supported at its outer end, and against the pinion itself. It follows from this that the end upon which the pinion F acts not being supported on the outer side the effect of the action of F upon this end is to cause a jerking or shifting of the axle of the pinion L. This is a simple fault in construction which men whose business it is will be able to remedy by means within their grasp. Thus for instance it would suffice to connect the axle of L to the slide-cheek B' by a box surrounding first the pinion F and supporting then the axle of L. The recuperating apparatus set free as above described can also return to the starting position. At this moment the conductor releases the operating lever, which returns automatically from *a* to A by the action of springs V, V' attached to the end links B⁴, B⁵, which springs bring back the movable

frame B through the same distance which it was displaced.

When the carriage has stopped dead, and it is desired to start it the conductor shifts his operating lever A from A to *a* and at the moment when the horse falls into its paces the recuperating apparatus is set free, the recuperative springs X in their recoil set the rack K in motion in the direction opposite to that of its movement when storing the force, and this gives rise to the action of the pinion F upon the gearing D which then moves the axle and consequently the wheels, so that the carriage is set in motion automatically without any effort on the part of the horse, which has then only to keep up the movement. This effect is produced as follows:—As the operating lever A is shifted from A to *a*, it carries with it the frame B which brings the pinion F into the main gear-wheel D with which it engages. The horse, pulling on the traces, draws lightly by means of my new system of traction G' (characterized by its mobility and by the fact that it has ball bearings see Figs. 3 and 4) upon the rod H, which is jointed to the pivoted lever I, Fig. 3. The latter, by means of a pawl W (Fig. 2) upon its median axis serves to lift the stop J which at this moment quits the rack K and the latter responding to the recoil of the recuperative springs X rotates the small pinion L and consequently the pinion F which is in one piece with it. The latter at this moment engages with the main gearing D and thus starts the vehicle as described above. The pivoted lever I is returned to its initial position by a spiral spring R² and consequently returns the new system of traction G, G' by the traction rods H, H'.

All the preceding description applies to what occurs when the vehicle is moving in the direction of the arrow Z. But the same action takes place in reverse order in the other direction (that of the arrow Z') for the lever A', Fig. 4, acts directly by drawing upon the movable frame B. Only, the pinion E causes the rack K to bring its notch *y'* up to the stop J (Fig. 2) in order to compress the springs in the direction Z' while previously the latter were compressed in the direction Z.

The operating lever A instead of being arranged outside the dash-board of the carriage may, if preferred, be placed inside the dash-board, and jointed under the platform, as shown in Fig. 5. Some supplementary members serve to insure the engagement and disengagement of the pinions, whether to prevent wrong action on the part of the conductor or to evade the dead points. These members are as follows:—

First. The lock M of which the bolt O engages alternately in front of and behind the projection S, Figs. 1 and 3, and thus serves, while stopping the frame of the recuperator to keep the pinion F engaged either with the pinion E or the main gear-wheel D.

Second. The little projections N, N which fixed in the interior of the rack K serve to drive the catch P of the lock, and draw back the bolt O either at the moment when the springs X have been compressed, or when they have given up their stored energy. The bolt is drawn back by the movement imparted to the catch P when the cam R (Fig. 2) meets the projections N, the cam being in one piece with the catch.

Third. The pawls T, T', Figs. 3, 6, and 9, which serve to stop the frame B automatically and to stop it after each movement of the operating lever A from A to a , in such a way as to render it impossible for the conductor to fall into the error of gearing the pinion F into the pinion E when it should be geared into the gear-wheel D and vice versa. The pawl T when in the position shown in Figs. 3, 6, and 9 prevents the conductor from gearing the pinion F into the main gearing D. In short, if the lever A undergoes movement from A to a' the pawl T being lowered comes to rest against the projection t^3 of the notch t , but if the lever undergoes movement from A to a the pawl t' being raised will pass over the notch t' and the pawl T will be released by its sliding movement upon the slope t^2 . After the recuperative springs X, X have been compressed the apparatus, returning automatically to its position of rest the pawl T' will be brought back into the notch t' as the result of the see-saw motion impressed upon it by the sliding of its angular projection v' upon the corresponding slope of the nose u' of the spring U', and the pawl T will remain raised because its projection v will slide against the nose u of the spring U which it will act upon as shown in dotted lines in Fig. 10. The pawls T and T' are prevented from moving (except when they are operated by the to-and-fro movement imparted to the recuperative apparatus by the driver) as the result of the pressure exercised upon them by the helical springs r, r' on their axis (see Fig. 10). The springs U and U' always bring their noses u and u' back to their normal position. The pawls T and T' are fixed upon the governing support Y (Figs. 7, 9, and 10) which is attached by cross-bars to the slide-cheeks B of the recuperative apparatus. The notches t and t' are made in the upper edge of the fixed counter-plate M'. The slide-cheek B follows the movement of the operating lever A, and gives motion to the pawls T and T', while the notches t and t' remain in one position in consequence of the immobility of the counter-plate M' in which they are made. In order that the engagement of the pinion F with the main gear-wheel D or with the central pinion E may be able to take place with certainty, in case the teeth should happen to meet end to end, the pinion F is rendered sensibly movable upon its axis by means of the following arrangement. A certain amount of play upon its key is given to it, the key being for this purpose narrower

than the key-way to such an extent that in case of need it can yield to the extent of half the thickness of a tooth (see Figs. 7 and 8). The tooth f , which is immediately below the one which always engages first, has one side cut away toward the top in such a way as to offer an inclined plane to the corresponding tooth of the gear opposed to it. It thus engages unfailingly even if the tooth f' which precedes it immediately abuts vertically and it forces the said pinion F to turn to the extent of the play which it possesses upon its axle in such a way that the tooth f' passes the point at which it met and is forced to engage also. In order to restore the position of the pinion F to the extent of the play allowed it, a special spiral spring f^2 is inserted in the cleft of a fixed squared pivot on the center of the axle of the pinion F. The outer end of this spring rises vertically in a branch f^3 which bears upon two gudgeons g and g' , one fixed directly over the pinion F, the other fixed on the axle of the said pinion. Between this spring and the nut of the pinion is mounted upon the square of the pivot a lever the arm f^4 of which rises parallel to the branch f^3 of the spring and bears, opposing the latter, between the two gudgeons g and g' . By this arrangement the branch f^3 compresses the spring outward by acting from left to right, while the branch f^4 compresses it inward by acting upon the pivot from right to left. It follows from this that whatever may be the direction of the play of the pinion F, and whether it engages with D or E (Fig. 2) it is always restored to its normal position by the spring f^2 and that it may play upon its key in one direction or the other in order to engage infallibly by avoiding its abutting upon the teeth of the gearing which it meets.

The recuperative apparatus above described is when in use, contained within a casing which protects it from the dirt thrown up by the wheels in wet weather and from the dust when the weather is dry.

It is to be noted that the recuperative springs X, X which yield with great ease as the result of the arrangement of the pinions E, F, L which divide the force, have a quadruple impulsive energy when acting on the main gear-wheel D. In fact, the carriage has to cover a distance of five meters to drive the recuperative apparatus home, and the latter only acts as a starting force for a distance of 1.25 meters but the energy of the impulse imparted is sufficient to drive the vehicle over a distance of seven or eight meters on a plain surface.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination of a frame B, the recuperative springs, a rack carried thereby, a pinion, a driving gear and an operating lever adapted to engage said pinion with said driving gear, substantially as described.

2. In combination with the pivoted lever I, traction rods in connection with the motive power, a pawl operated by the said lever and a spring stop lifted by said pawl, substantially as described.
3. In a car starter, the combination of the stop J, the rack K having retaining notches y, y' and the springs X, X, substantially as described.
4. In combination with the rack K and springs X, X, the lock M composed of two slides, a bolt and catch moving vertically therein, a cam R and projections on the rack K, substantially as described.
5. In a car starter, the pawl and ratchet mechanism consisting of a pair of pawls T, T', the frame B and the operating lever, substantially as described.
6. In a car starter, the combination with the lever A, of the cheek springs V, V', substantially as described.
7. In a car starter, the driving pinion F, a spiral spring contained in a central cavity thereof, and acting in two directions, substantially as described.
- In testimony whereof I have signed this specification in the presence of two subscribing witnesses.
- JOSEPH DESMEDT.
- Witnesses:
GREGORY PHELAN,
GEORGE BEDE.